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(71) Applicant: **KABUSHIKI KAISHA TOSHIBA**
Kawasaki-shi (JP)

(72) Inventors:
- **Kurano, Tomoaki,**
  c/o Intel. Prop. Div K.K. Toshiba
  Tokyo 105 (JP)
- **Mimura, Hideki,**
  c/o Intel. Prop. Div K.K. Toshiba
  Tokyo 105 (JP)
- **Kikuchi, Shinichi,**
  c/o Intel Prop Div K.K. Toshiba
  Tokyo 105 (JP)
- **Taira, Kazuhiko,**
  c/o Intel. Prop. Div K.K. Toshiba
  Tokyo 105 (JP)
- **Hagio, Takeshi,**
  c/o Intel. Prop. Div K.K. Toshiba
  Tokyo 105 (JP)

(74) Representative: **Henkel, Feiler, Hänzel & Partner**
Möhlstrasse 37
81675 München (DE)

(54) Information storage and information transmission media with parental control

(57) Parental information of a video program recorded on an optical disk is always checked (S43 to S45) in a disk player. Even if a jump of laser beam tracing of an optical head erroneously occurs due to shocks or vibrations, the content of parental information assigned to the destination of optical head jumping is checked, to thereby achieve an accurate parental control of selective restriction for the video whose reproduction or presentation is restricted by the parental information.

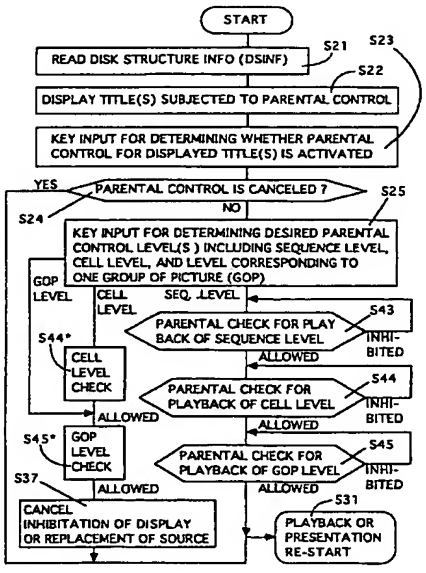

FIG. 29

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As FNAST, the number of audio streams in each file is written.

As FNSPCH, the number of sub-picture channels in each file is written.

As FACODE, the language codes (English, Japanese, and the like) of audio streams are consecutively written in the order of audio stream numbers. If an audio stream type is data other than languages, FFh is written.

As FSPCODE, the language codes (English, Japanese, and the like) of sub-picture channels are consecutively written in the order of channel numbers. If corresponding data is not a sub-picture type, FFh is written.

As FSINF, parental control data for the respective titles and the numbers of angles and programs in the titles are written in the order of title numbers, starting with #1.

The number of titles is the sum total of self-terminating type sequences and connection type start sequences in each movie or music file.

The title numbers continue in the ascending order of sequence numbers in file number #1, with title #1 corresponding to a sequence of file number #1. After the last sequence subjected to title selection, the title number follows file #2 sequence #1.

As the parental control data, the parental level of each sequence is written.

As the number of angles, the number of angle cells in an angle block contained in a sequence is written. If there is no angle block, "0" is written.

As the number of programs, the number of programs in each sequence is written.

The menu structure information (MSINF) in menu structure information area 87 is the position information of picture data for a menu which is stored in each file.

As shown in FIG. 8, the menu structure information is constituted by the following parameters: MOMCEL (number of menu cells), TMSCEL (title menu start cell number), ADMSCEL (audio menu start cell number), SPMSCEL (sub-picture menu start cell number), PEMSCEL (program menu start cell number), and AGMSCEL (angle menu start cell number).

As MOMCEL, the number of menu cells recorded on this file is written. If there is no picture data for a menu is the file, 00h is written.

As TMSCEL, a title menu start cell number is written. If there is no title menu cell, 00h is written.

As ADMSCEL, an audio menu start cell number is written. If there is no audio menu cell of the corresponding file number, 00h is written.

As SPMSCEL, a sub-picture menu start cell number is written. If there is no sub-picture menu cell of the corresponding file number, 00h is written.

As PEMSCEL, a program menu start cell number is written. If there is no program menu cell of the corresponding title number, 00h is written.

As AGMSCEL, an angle menu start cell number is written. If there is no angle menu cell, 00h is written.

Menu cell information table (MCIT) 88 is a table in which pieces of menu cell information (MCI) such as positions, sizes, and reproduction times required to reproduce menu cells 90 are consecutively written. In menu cell information table 88, the pieces of menu cell information (MCI) are defined by a set of i menu cell information areas 89 written in the order of menu cell numbers.

As shown in FIG. 9, each menu cell information (MCI) in menu cell information table 88 is constituted by the following parameters: MCCAT (menu cell type, or menu cell category), MCSSCR (menu cell start pack), MCSLBN (menu cell start logical block number), and MCNLB (number of (constituent logical blocks).

As MCCAT (menu cell type/category table), the following pieces of information are written: copy control information indicating whether a copy operation is permitted or inhibited, parental control information indicating the parental levels of all picture data constituting each menu cell, menu type information indicating a title menu, a program menu, an audio menu, a sub-picture menu, or an angle menu, and a language code of a menu cell.

As a language code, a code number in a language code table is written.

As MCSSCR, the upper 32 bits of SCR (system clock reference; system time reference value) written in a menu cell start pack are written.

As MCSLBN, an offset logical block number from the file start position as the menu cell start address is written.

As MCNLB, the number of logical blocks constituting each menu cell is written.

In this case, the disk structure information (DSINF) and the menu structure information (MSINF) are consecutively written in file management information area 82. Menu cell information table (MCIT) 88 is aligned with a logical block boundary.

Music and movie data of one or a plurality of titles are respectively stored in movie and music files 78 corresponding to file numbers 1 to 99.

As shown in FIG. 10, each file 78 has a file structure constituted by file management information area 101 and video data area 102. In file management information area 101, management information (address information and reproduction control information, etc.) is written. In video data area 102, the video data of file 78 (video, audio, and sub-picture data pieces, etc. are simply referred to as video data) is written.

In video data area 102, video data is divided in units of cells, similar to menu data cells 90 of disk information file 76. That is, the video data is arranged as j picture data cells 105.

In general, movie or audio data of a given title is expressed as a set of consecutive sequences (or consecutive program chains) 106. For example, a movie story is expressed by consecutive sequences 106 corresponding to "introduction", "development", "turn", and "conclusion".

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Video data area 102 of each file 78 can be defined as a set of sequences (or program chains) 106, as shown in FIG. 11. Each sequence 106 is expressed by a plurality of video programs (chapters) 107 corresponding to various scenes of the story. Each video program 107 is constituted by a plurality of picture data cells 105.

Incidentally, in FIG. 11, the file including one or more sequences is indicated as a video title set VTS; the sequence (or program chain PGC) including one or more programs is indicated as video object set VOBS; and the program including one or more cells is indicated as video object VOB. In this case, each cell is formed of one or more information packs, and each pack is formed of a pack header and one or more packets.

Each picture data cell 105 is constituted by a plurality of image groups (GOP: Group of Pictures) each including disk search/data search information (DSI) pack 92, main picture pack 93, sub-picture pack 95, and audio pack 98, as shown in FIG. 12.

The arrangement of picture data cell 105 is almost the same as that of menu data cell 90. In video data area 102 (FIG. 10), movie, audio, sub-picture data and the like compressed according to a compression standard such as the MPEG (Moving Picture Expert Group) standard are recorded according to a data format corresponding to the system layer of MPEG2.

That is, the data in video data area 102 is a program streamer specified by the MPEG standard. Packs 92, 93, 95, and 98 each have a pack structure constituted by pack header 97 and packet 99 corresponding to a pack.

The main picture pack of the above movie is constituted by I-, P-, and B-pictures (Intra-picture, Predictive-picture, and Bidirectionally predictive-picture).

A plurality of sub-picture packs constitute a sub-picture unit. One still image is obtained from this sub-picture unit. At least one sub-picture unit can be formed in one cell.

File management information area 101 (FIG. 10) is constituted by file management table (FMT) 113, sequence information table (SIT) 114, cell information table (CIT) 115, etc.

The picture data cells in video data area 102 are consecutively numbered in the order of recording on the optical disk 10, starting with #1. These cell numbers are written in cell information table 115, together with pieces of information about cells in connection with the cell numbers.

More specifically, cell information table 115 is defined by a set of areas 117 in which j pieces of cell information (CI), which are written as information required for reproduction of picture data cells in the order of cell numbers, are stored. As this cell information (CI), information such as the position, size, reproduction time, etc. of a cell in file 78 is written.

FIG. 13 shows the contents of cell information (CI) stored in cell information table 115. As cell information (CI) written in cell information area 117, the start position of a picture cell obtained by dividing video data into units in accordance with a purpose, a size, etc. are written in the form of parameters.

More specifically, this cell information (CI) is constituted by cell type (or cell category) information (CCAT) indicating the contents of the picture cell which indicate whether the picture cell belongs to a movie, karaoke data, or an interactive menu; cell reproduction information (CTIME) indicating the total reproduction time of the picture cell; system time information (CSSCR) described in the cell start pack; cell start position information (CSLBN) indicating the start position of the picture cell, i.e., the start address; and full size information (CNLB) indicating the size of the picture cell.

The cell type/category information (CCAT) is formed of copy control information indicating whether a copy operation is permitted or inhibited, parental control information indicating the parental level of the video data constituting the video/picture cell, cell type/category information indicating whether the video/picture cell belongs to a movie, karaoke data, or an interactive menu, and a language code (if the cell type/category information indicates an interactive menu).

Sequence information table 114 is defined by a set of areas 116 in which i pieces of sequence information (SI), each written as information indicating, e.g., the order of selection and reproduction of cells 105 within a range designated in units of sequences 106, are stored. As each sequence information (SI), reproduction control information, with respect to the reproduction order and reproduction operation of picture data cells 105 recorded in sequence 106, is written.

Sequence 106 includes a self-terminating type sequence (or a single program chain PGC) which is completed by itself, and connection type sequences (or a plurality of program chains PGC's) which can be branched off and connected to the next sequence (or subsequent program chain).

The connection type sequences include a start sequence of video data representing multi-story programs. These connection type sequences are formed of: a connection type start sequence which can be branched off and connected to the next sequence (i.e., a connection type start sequence with which the story is changed in accordance with the manner of selection); a connection type intermediate sequence which can be branched off from another connection type sequence and is connected to still another sequence; and a connection type end (or termination) sequence to which another connection type sequence is connected to terminate this sequence, i.e., a connection type end sequence with which the story is terminated.

The numbers of these pieces of sequence information are defined as sequence numbers 1 to i, and the start position information of each sequence is written in file management table 113.

FIG. 14 shows the contents of one piece of sequence information (SI) stored in sequence informa-

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needed, to be used for a monitoring operation in reproducing video data.

When reproduction of one cell is completed, cell information to be reproduced next is acquired from cell reproduction order information in sequence information, and reproduction processing for the acquired cell information is continued in the same manner as described above.

Assume that the optical disk apparatus reproduces a parental control target portion of optical disk 10 on which parent information is recorded. A basic operation for such a case will be described next with reference to the flow chart of FIGS. 29 to 32.

First of all, disk structure information (DSINF) in a disk information file is loaded into data RAM section 56 (step S21).

Parental information about all sequences recorded on optical disk 10 is referred to on the basis of loaded disk structure information DSINF, so as to display a title subjected to parental control on monitor section 6 (step S22).

A specific user (authorized on the basis of a password or the like) operates key operation section & display section 4 to key-input the information indicating whether to validate the reproduction restriction of the above title subjected to parental control (step S23).

Note that the specific user can cancel only parental control of a level more moderate than the reference level recorded in system ROM/RAM section 52.

When the user cancels the parental control, parental cancellation information is stored in system ROM/RAM section 52. When the user does not cancel the parental control (step S24, no), he/she operates key operation section & display section 4 to key-input the information indicating a desired level (or levels) of parental control with respect to the sequence, cell, or GOP level (steps S25).

Incidentally, the number of hierarchical levels of program sources to be subjected to the parental control may be two, for example, the file level (or title set level) and the sequence level (or program chain level).

If the restriction (parental control) of reproduction or presentation for the sequence level (or program chain level) is selected in step S25, each sequence information (SI) in sequence information table (SIT) 114 is loaded into data RAM section 56 (step S26 in FIG. 30). Then, a reproduction/presentation restriction start sequence number and a reproduction restriction end sequence number are detected.

Thereafter, respective sequences (or program chains) are sequentially loaded (step S27), and it is checked whether each sequence (program chain) is subjected to specific parental control, or is subjected to restriction of reproduction or presentation (step S28).

More specifically, it is checked from the parental level of each sequence (program chain), whether each sequence (program chain) is to be subjected to restriction of the parental control, or is to be subjected to reproduction restriction.

If it is determined that a given sequence (program chain) is to be subjected to the reproduction restriction (step S28, yes), this sequence (program chain) is not reproduced (step S29), and characters indicating that parental control is being performed are displayed on monitor section 6 (step S30).

The next sequence is then loaded. If the next sequence is not subjected to parental control (step S28, no), reproduction is resumed (step S31 in FIG. 29).

Incidentally, at step 29 of FIG. 30, if the sequence (or program chain) to be reproduced next is subjected to parental control, in place of reproducing this next sequence (program chain), another sequence (or program chain), which is not subjected to the parental restriction, may be reproduced.

If the reproduction/presentation restriction of the cell level is selected at step S25 in FIG. 29, cell information in the cell information table (CIT) is loaded into data RAM section 56 (step S44* in FIG. 29, or step S32 in FIG. 31). Then, a reproduction restriction start cell number and a reproduction restriction end cell number are detected.

The respective cells are sequentially loaded (step S33), and it is checked whether each cell is to be subjected to restriction of reproduction or presentation (step S34).

More specifically, it is checked from the parental level of each cell whether each cell is to be subjected to parental control, or is to be subjected to reproduction restriction.

If it is determined that a given cell is to be subjected to reproduction restriction (step S34, yes), a reproduction inhibition signal is output to each of decoder sections 58, 60, and 62, so as to stop output of any decoded signal (step S35).

Alternatively, if the cell representing a specific scene of a given title is subjected to the parental control, this scene may be replaced with another scene, or switching to another angle of multi-angle pictures prepared separately may be performed (step S35).

Thereafter, characters indicating that parental control is being performed are displayed on monitor section 6 (step S36).

When the reproduction restriction period of the cell comes to an end (step S34, no), unless other parental restriction exists, reproduction inhibition or picture replacement is canceled (step S37 in FIG. 29), and reproduction is resumed (step S31).

If the reproduction/presentation restriction of the GOP level is selected at step S25 in FIG. 29, pack data are sequentially loaded into data RAM section 56 (step S45* in FIG. 29, or step S38 in FIG. 32). Then, the parental information of each GOP is read from disk search/data search information (DSI) arranged for each GOP (step S39). It is checked from the read information whether a target GOP is to be reproduced (step S40). Or, it is checked from the parental level of the target GOP whether the GOP is to be subjected to reproduction restriction.

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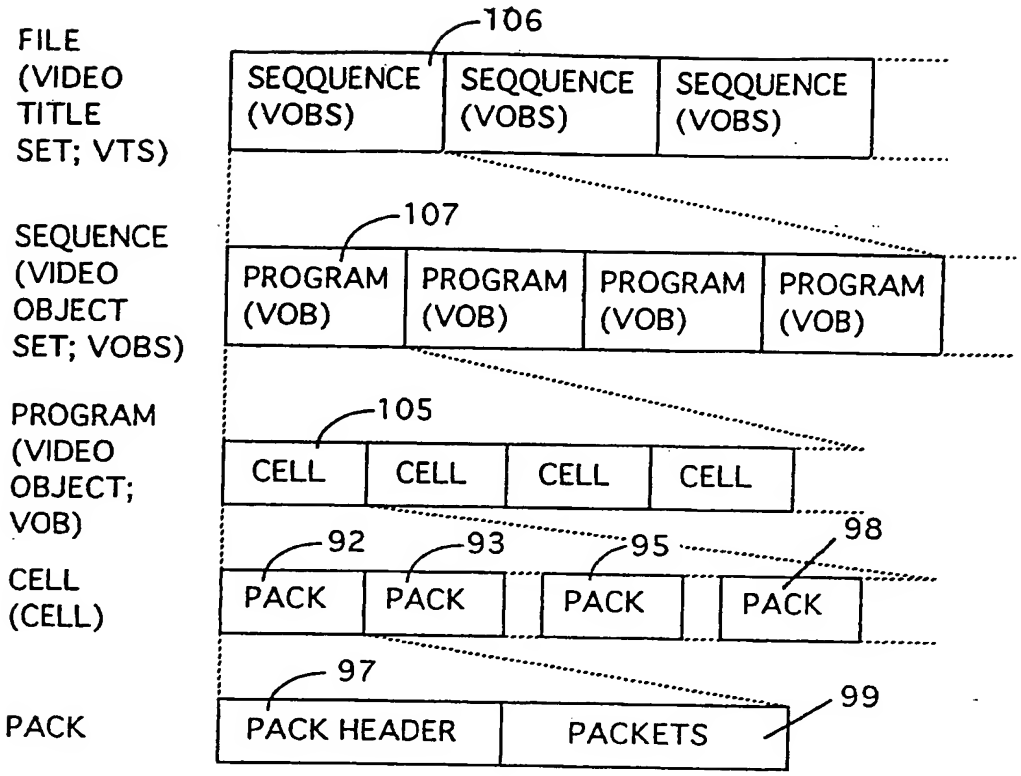

FIG. 11

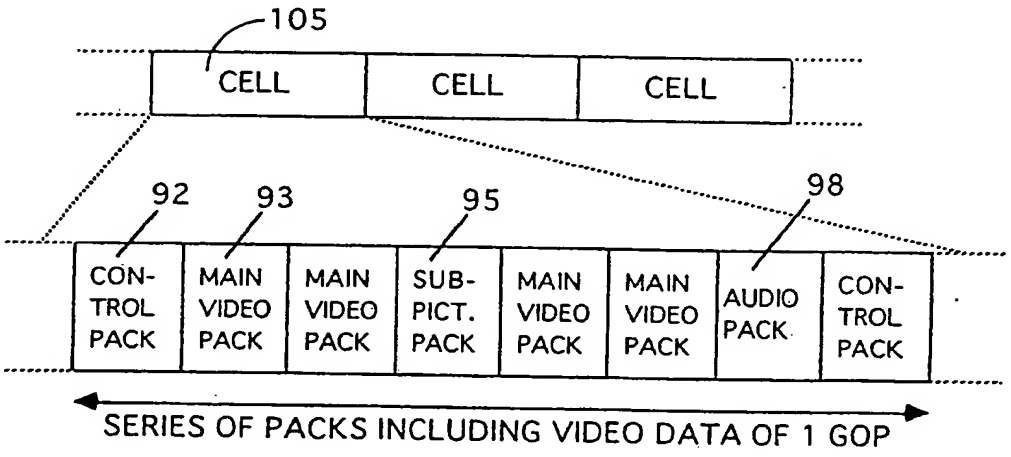

FIG. 12

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CELL INFORMATION (CI)

PARAMETER	CONTENTS
CCAT	CELL CATEGORY (FOR COPY CONTROL; PARENTAL CONTROL; TYPE OF CELLS; LINGUAL CODE; etc.)
CTIME	PLAYBACK/PRESENTATION TIME FOR CELL
CSSCR	SYSTEM CLOCK REFERENCE DESCRIBED IN START PACK OF CELL
CSLBN	LOGICAL BLOCK NUMBER OF START CELL
CNLB	NO. OF LOGICAL BLOCKS CONSTITUTING CELL

FIG. 13

SEQUENCE INFORMATION (SI)

PARAMETER	CONTENTS
SCAT	SEQUENCE CATEGORY (FOR COPY CONTROL; PARENTAL CONTROL; TYPE OF SEQUENCE; USE OF SEQUENCE; etc.)
SNPRG	NUMBER OF PROGRAMS CONSTITUTING SEQUENCE
SNCEL	NUMBER OF CELLS CONSTITUTING PROGRAM
STIME	PLAYBACK/PRESENTATION TIME FOR SEQUENCE
SNCSQ	NUMBER OF CONNECTABLE SEQUENCES
SCSQN	NUMBER OF SEQUENCE CONNECTED
SCINF	SEQUENCE CONTROL INFORMATION

FIG. 14

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FILE MANAGEMENT TABLE (FMT)

PARAMETER	CONTENTS
FFNAME	FILE NAME
FFID	FILE ID
FSZFMT	FILE SIZE OF FILE MANAGEMENT TABLE
FNSQ	NUMBER OF SEQUENCES
FNCEL	NUMBER OF CELLS
FNDSIP	NUMBER OF PACKS FOR DSI (DSI=DISK/DATA SEARCH INFO.)
FNLB	NUMBER OF LOGICAL BLOCKS CONSTITUTING FILE MANAGEMENT TABLE
FSASIT	START ADDRESS OF SEQUENCE INFO. TABLE
FSACIT	START ADDRESS OF CELL INFO. TABLE
FSADSM	START ADDRESS OF DISK/DATA SEARCH MAP
FSADVD	START ADDRESS OF DIGITAL VIDEO DATA
RESERVED	RESERVED FOR FUTURE USE
FSAESI	START ADDRESS OF SEQUENCE INFO.
FSNCIB	MINIMUM NUMBER OF CELLS IN SEQUENCE
FVATR	ATTRIBUTE OF VIDEO
FNAST	NUMBER (n) OF AUDIO STREAMS
FAATR	ATTRIBUTE (#1 to #n) OF AUDIO STREAMS
FNSPCH	NUMBER (m) OF CHANNELS OF SUB-PICTURE
FSPART	ATTRIBUTE (#1 to #m) OF SUB-PICTURE CHANNELS
FSPPLT	COLOR PALETTE FOR SUB-PICTURE
RESERVED	RESERVED FOR FUTURE USE
FVDEF	DEFINITION OF VENDORS/PROVIDERS

FIG. 15

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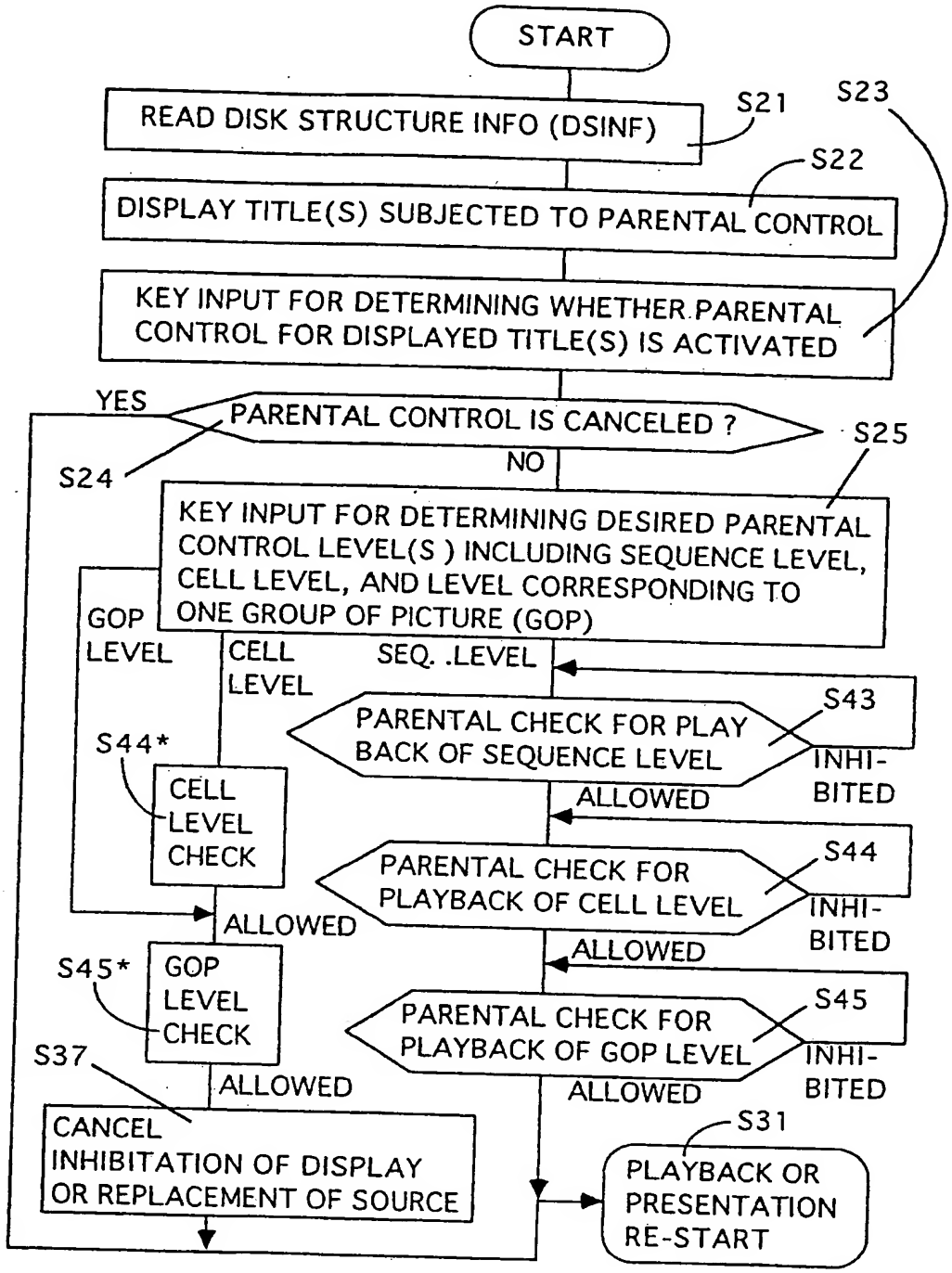

FIG. 29

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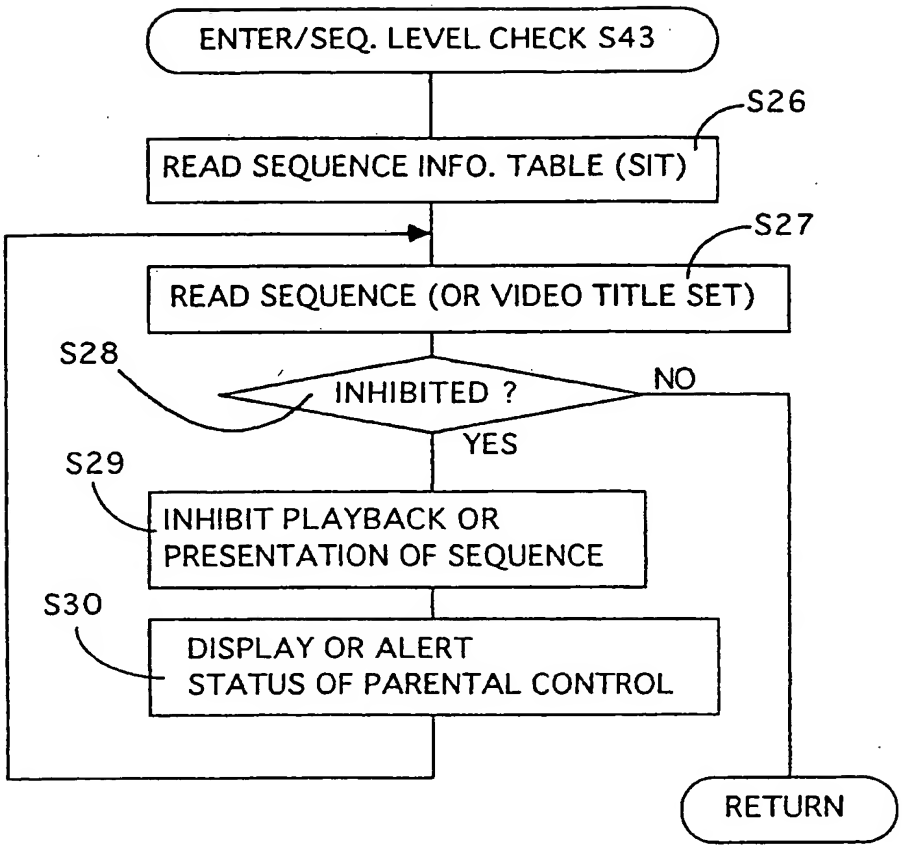

FIG. 30

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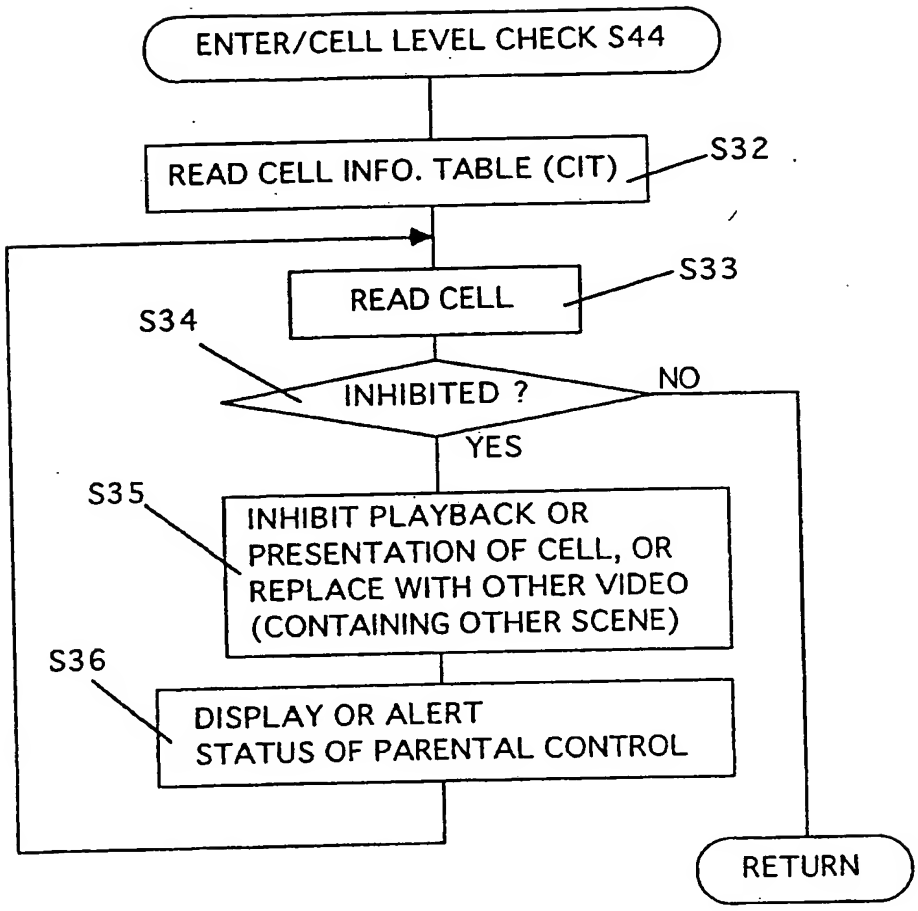

FIG. 31

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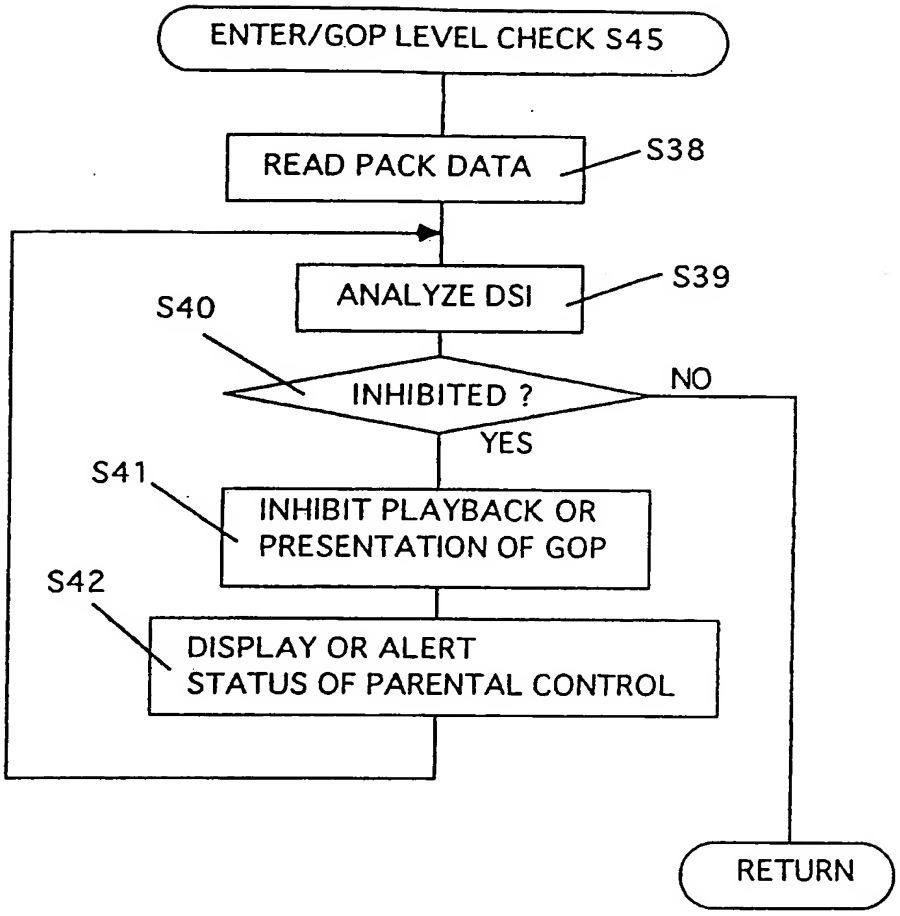

FIG. 32

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